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PRESENT STATUS OF THE SPRAY RESIDUE PROBLEM IN MICHIGAN*

By J. O. Clarke

Given before the Sixty-first Annual Meeting of the Michigan State Horticultural Society, 1931.

The Food and Drugs Act—better known as the Pure Food Law—aims to protect the American people from the consumption of food which may be dangerous to health or which may be otherwise objectionable. You are interested in supplying the consumer with fruit and it goes without saying that your desire is that this fruit shall be free from danger to the consumer. It is to your interest to develop and enlarge your markets and in accomplishing this end you know that the confidence of the consumer in your product is essential. It, therefore, follows that the purpose of the Pure Food Law and your aims are identical, both working to the end that the consumer will have available a supply of fruit in which he has justifiable confidence. I think you will agree with me that consumer confidence will not be justified so long as there is any suspicion that the fruit bears excess residues of arsenic and lead.

The prevalence of certain insect pests in our orchards makes it necessary that we fight and destroy them if we are to produce a crop of apples. Our entomologists have taught us that with our present knowledge we have to spray our fruits with lead arsenate for effective control.

Our obligation to the consuming public requires us to remove the spray residue from the fruit before it is fit for the consumer. Even if there were no laws, I am sure that in time the industry itself would take steps to remove excess residues—the existence of these laws simply hastens the process.

In the beginning I feel that you will be interested in a statement as to just what is required of the apple industry by the Federal Food and Drugs Act. In the first place, the act is not operative unless an interstate shipment is involved. No violation of the act is committed, insofar as spray residues are concerned, unless a specific interstate shipment contains a poisonous residue. The Federal Food and Drugs Act gives no authority to prescribe any particular method of spray residue removal. The Department

*(Editors Note—This article is printed not to force growers to believe that we must wash apples, but merely for general information. With residue tolerance reduced, it is possible that we may have to figure on washing fruit at some future time. Our Maryland Spray Calendar is designed to give maximum control of insects and very low residue. Many growers are asking for information regarding removal of leaf hopper residues. This article is of interest to these growers.)

of Agriculture cannot say to you that your apples must be washed, brushed, or otherwise treated. We can only say that action under the act will be taken if interstate shipments of fruit contain any added poisons or other added deleterious substance which may render such article injurious to health.

I think some of you might doubt that small amounts of arsenic and lead are poisonous substances. Undoubtedly there are men in this room who have used lead arsenate for spraying hundreds of times, have spilled it all over themselves and have doubtless accidentally taken some of it into the mouth and have not consciously been poisoned. Many of you have eaten heavily sprayed fruit and are still alive. But medical evidence to an overwhelming extent considers these substances—lead and arsenic—in the amounts frequently found on sprayed fruit as dangerous to health. The danger is not one of acute poisoning. The victim does not fall over and die from eating a single apple—the danger is in the long time insidious effect of the continued consumption of very small quantities of arsenic and lead. These substances are known as cumulative poisons—the system does not throw them off, but they are retained in the body to be added to from time to time until there is sufficient to produce bodily harm. Often the heart, kidneys, liver or other organs may show evidence of deterioration, the ultimate cause of which may be obscure to the doctor. There is also the qusetion of individual susceptibility, some people can stand more than others—what may be assimilated by one person without apparent harm may undermine the health of another. Our fruit must be made safe for all, not only those in robust health, but for the young and the old, the sick and the well, those who are susceptible to the poisons as well as those who can tolerate them.

It is hardly necessary for me to tell a group of apple producers how to meet the spray residue problem. Judging from the progress that has been made, you know the answer to the problem and have gone a long way toward solving it. Where more frequent sprays are essential your industry is making commendable progress in the installation of washing machines to remove the excess residues.

In the adoption of solvent methods of residue removal, your state is making a wise choice. There seems to be only three practical means of restricting residues:

1—Limiting the application of spray material.

2—Dry cleaning by means of brushing machines or otherwise.

3—Cleaning in washing machines or dipping vats by means of solvents.

A program of control based on limitations of spray application should be undertaken only in those sections where the limited sprays will be effective in controlling our pests. We will profit nothing if we raise only a crop of worms, even if the few apples we get are free from residue. If you know you can kill the insects and at the same time avoid an excess residue there is no objection whatever to using that method. Your entomologists will have to advise you as to the amount of spray that can be applied without leaving an excess residue.

A large proportion of our fruit may be harvested bearing excessive residues which must be removed before it can be marketed. This means either brushing or other dry cleaning methods or the washing machine. The evidence before us at the present time is not favorable to dry cleaning

methods. Last year our chemists examined seven samples of apples before and after wiping. Th range in arsenic control before wiping was 0.029 to 0.009. After wiping the range was from 0.023 to 0.007. These samples were from mid-western fruit and indicate, in a general way, what may be expected from wiping. The Bureau of Plant Industry (Farmers' Bulletin 1687) says on this subject:

> "Dry-cleaning methods generally can not be depended upon to remove consistently over 30 per cent of the residue from apples. Cloth or brushes used in dry cleaning should be changed frequently."

This leaves us with the washing machine as the most effective method of removing excess residues. In other words, spray just as much as necessary to control the pests and then put the fruit through a washing machine.

Now, let us see what our experience has been in the operation of acid washing machines here in the Central West. We have made duplicate analyses of 42 lots of apples before and after passing through the washing process. This work was done on all types of machines ranging from the most elaborate commercial affair to simple arrangements for dipping as used in some of our big cities for reconditioning apples which had been seized. The average reduction of arsenic amounted to 80%. The average amount of arsenic on the apples before washing was 0.020 grains per pound; after washing, 0.004. The range before washing was from 0.040 to 0.002. The range after washing was from 0.013 to only a trace. Two results were higher than the present domestic tolerance. This was probably due to the improper use in some way of one or two machines. It may have been due to any number of factors. Suffice to say, however, that any process which is effective among a great number of operators, many of whom were inexperienced, which yields effective results 40 times out of 42 must be good. One other sample contained 0.012 grains per pound after washing. Thirty-nine of the 42 samples complied with the world tolerance. I think these effective demonstrations conclusively show that an acid washing machine, properly operated, will do the job effectively.

It is beyond the scope of this talk to go into detail about the operations of the washing machine. The Bureau of Plant Industry has gone into the subject fully in Farmers' Bulletin 1687, which every one expecting to wash apples should study. Write to the Department of Agriculture in Washington, D. C., and get your copy.

I have heard a great many of our people talk about the rain as a remedy for residue removal. But I want to sound just a word of caution here against a too great confidence in this factor. Our experience is that rainfall and weathering does help a little, but lead arsenate is too insoluble and sticks too tight for rainfall—even in great quantity—to be very effective. We have examined samples of apples before and after they passed through a washing machine where only water was used as the solvent and found only a small reduction in arsenic content. If the perfect deluge of water in a washing machine fails, how can we expect even the hardest rainfall to be effective. In one of your neighboring states there was more than the usual rainfall this year. Many of the growers felt that had solved their problem, but an investigation after all of the rainfall showed more than half of the samples collected to contain an excess residue. In this same section, many of the growers had analysis made of their fruit. After the hard rain

just as many samples had an excess of residue as before. Growth and weathering does help some, but even the hardest rain will not take the place of a good washing machine.

Several types of home built machines are described in Farmers' Bulletin 1687. These home made machines have been tried out in actual practice and they are entirely practical and will do a good job of cleaning. The bulletin gives you construction detail which can be followed by any intelligent workman. The larger operators may find it to his advantage to purchase one or more commercial machines—there are several good ones on the market.

While on the subject of washing, I think it important enough for me to read you what the Bureau of Plant Industry has to say about costs in Farmers' Bulletin 1687:

> "While the cost of washing fruit will vary, of course, with the section of the country in which it is done, as well as with the washing method, the tonnage of fruit, the packing arrangements, and the character of the spray residues on the fruit, it may be helpful to indicate such costs approximately.
>
> "In the Pacific Norhtwest the cost of washing a box or bushel of fruit will range from 1 to 2 cents for hand dipping in small lots and 2 to 3 cents for the paddle washer to 3 to 4 cents for washing moderate tonnage in the commercial machines, with a proportionate reduction per box as the tonnage is increased and the overhead costs are distributed over a greater number of boxes.
>
> "Under eastern conditions the cost per bushel has generally been from 1 to 5 cents, with 2 to 2½ cents as a fair average. The cost of washing decreases as the amount of fruit handled increases; it also depends on the initial cost of the machine. The cost of washing 5,000 bushels with a small commercial machine would be about 5 cents a bushel, 2 cents with a paddle washer, and 2¾ cents for hand dipping. For 15,000 bushels the costs per bushel would be about 2¼ cents for the commercial machine, 1 cent for the paddle washer, and 2½ cents for hand dipping. Except in the case of hand dipping, the cost of labor is not materially increased because of washing. In arriving at the foregoing estimates, interest and depreciation on the investment, maintenance, and cost of water, power, and materials were considered.
>
> "While no actual cost estimates for dry-cleaning fruit are available, such figures as have been calculated from time to time have indicated that washing fruit is a more economical as well as a more efficient method of removing arsenical spray residues from apples and pears."

These cost figures are very impressive and they make me wonder why any of us try other methods of control with the cost of washing so low. Why should we take a chance on questionable experiments with the possibility staring us in the face of losing our fruit or having to clean it after it gets to market?

Another factor in favor of washing is that it makes possible the marketing of slightly damaged windfalls and other fruit which cannot be successfully sold unless washed. Entirely apart from any question of residue con-

trol, it enables us to make a little money on this kind of fruit that is impossible without a washing machine. I have been told by many packers that they would continue to wash their output even if there were no residue problems—with the low cost of washing and the extra profit from windfalls—washing with these men is a profitable venture.

DOES THIS MEAN US, TOO?

Mr. W. H. Esslinger, representing the Michigan State Department of Agriculture was telling the Michigan growers of some of the marketing problems in that State. Speaking before the State Horticultural Society, 1931, he told of Benton Harbor Market where about 7,000 cars of fruits and small fruits and some vegetables are sold yearly. The majority of this produce is sold to truckers or peddlers. Remember that this refers to Michigan conditions, but it is easy to see that their problems are much like ours. Evidently some of this fruit is poor stuff, for the speaker said, in part:

"This volume is transported by truck into Michigan, Indiana, Ohio, Illinois, Wisconsin, Minnesota, Iowa, Kentucky, Tennessee, West Virginia, the Dakotas and other states which brings to light another very important factor in the Markting of Michigan Fruits.

Michigan's Fruit Industry of today in respect to the marketing thereof, is dependent upon truck transportation. I hesitate to call these men just mere Truckers, they have outgrown this title and the use of it should be discontinued.

What have these so-called truckers accomplished in the past ten years? Have you paused long enough to consider what they have done in the last decade? My experience and contact with them and their activities has given me an opportunity to watch their invasion and progress. Let us consider a few of the material things they have done:

Almost Supplanted Railroads
Almost Supplanted Steamboats
Almost Supplanted Commission Merchants
Almost Supplanted Commission Merchants' Agents

This is some progress within the short space of ten years. They buy, transport and resell. They have direct contact with the dealers, distributors and consumers in most of the large and small consuming centers within a radius of 500 miles where Michigan fruit is purchased. They have established a real business and yet we refer to them as Truckers. Permit me to christen them Dealers. If this ever was rightly applied to mean a person who buys and sells fruit, why not to these men that in addition to buying and reselling, also transport?

These Dealers do everything but produce. We do that and they represent our production ability to the many millions of consumers within their transporting scope. Should we be interested in the kind of fruit producers they represent us to be? Should we be interested in the type and character of service they extend to our present and future customers? Are we interested

in the quality of fruit they resell? We have 25 million consumers within their transporting possibilities. They can and shall continue to increase in numbers and from my observations and contact, I do not hesitate to state that Michigan's Future Fruit Industry depends entirely on the quality of fruit these Dealers handle in their capacity as our representatives.

A few years ago, it did not do much harm to sell an occasional load of ungraded fruit in the unmarked packages to these Dealers. At that time, they were not so numerous. It is different now. They are our Advertising Agents. They resell what we sell to them. If it is not of the quality that it should be, the person that sells it to them is at fault, and every such load is a sad mistake. We cannot expect a reputation for other than poor quality in every city and town within 500 miles, as long as we sell poor quality to our Dealer Representatives. My advice is to discontinue this practice. The past season, up to this time, has been a good example of what we may expect in the future unless we do differently.

It seems as though everybody wanted to sell their Commercials and Ciders for something. Effort was untiringly extended toward this goal, and what has been the result. Every city and town within 500 miles has been offered "Michigan Apples" for twenty-five to sixty cents a bushel. What is happening today? There are many good Michigan apples in storage, waiting for our natural consumers to buy at a better price after this low price has been established and our reputation for poor pack advertised by the many Dealers to whom these apples are sold. This is a Producers' problem; they hold the answer in their hands. We will profit or lose as the producers choose. There is no place for a poor pack these days. It either must be a good pack or a better one.

As the sale of ungraded, undesirable apples has been indulged in by most Growers and Associations, these statements can be annexed to most Michigan Producing Sections.

The past season, many producers purchased second-hand bushel baskets to pack their peaches and apples. Some of these containers were filthy and none were attractive. No doubt a few cents was saved on each basket. These found their way into cities and towns where we do most business. Do you question that in time it will prove to be a costly piece of economy?

The time has arrived when we must get together, better understanding the magnitude and scope of these Dealers and do things that will result in mutual benefits. The production of a greater per cent of A grade quality must be brought about, if we expect to hold our own in these competitive days. It is the best solution to every problem that we are confronted with. This was a bad growing and marketing season. It is now a far reference and I am not unmindful of the many disappointments met up with in 1931. We trust that our climatic and economic conditions in the future will have better results in store for us. However, my statement will stand as made; we must produce more of the good fruit and less of the poor. When we do this we will have less trouble to control the sale of our undesirable portion.

The question of varieties is always interesting. It not only involves apples but strawberries, red raspberries, peaches and more of our fruits we sell. But apple varieties, generally speaking have the first call. Most every producer agrees that we have too many apple varieties and I heartily endorse that decision. Our expansive growing sections geographically, tends

to make the selection of a few standard varieties a problem. Some claim this variety and others have their first favorites. It appears to me that our selections must be governed accordingly and perhaps the cutting down of our present too numerous varieties will have to be confined to one section at a time. If proven successful, others will follow.

There are two varieties which I want to say a few words in reference to, one is the Yellow Transparent and the other the Duchess. A few years ago, Michigan Transparents were a treat to most folks. The housewife considered it her duty to supply some for her household. Today, most folks are fed up on nice southern peaches at the time we harvest and market our Transparents. The housewife has a choice either of nice, large juicy peaches or small green Transparents. Which of these would you choose? Along with that we now have competitors that grow red apple varieties that come the same time that our Transparents do. If we are going to continue with our Transparents, we will have to thin until we are sure to get the size that attracts attention. A few scattering good sales of large Transparents are always possible, but the days when a large volume of small apples of this variety can be sold profitably are gone forever.

The Duchess variety is in the same position. If there is any difference, it is not favorable.

Michigan Wealthies have an opportunity to make good. They have quality and a desirable color when mature. They, as a rule, bear too heavy. For various reasons producers do not find time to thin this variety. About two weeks before they should be picked, some growers take off the small inferior apples to relieve the tree. They place them into a package and dispose of them to their local groceryman. This is a bad practice. The groceryman places a small sign over them to indicate that they are Michigan Wealthies, in some instances the same type are consigned or sold to a dealer who places them on sale in some of our best markets. This advertising with small cracked Wealthies, not alone is wrong to advertise a good apple, but it is also injurious to the sale of the better and later varieties.

The general practice of growers to sell poor ungraded and often unwholesome fruit to their local groceryman is one of our most serious handicaps. It serves to force Michigan fruit in the low unwanted class and at the same time advertises our competitors, as high class producers and packers. Each and every one of you have knowledge of this yet there is nothing being done about it. We should market 50% more of our fruit within the state. We will never accomplish this until we revolutionize our present methods, which can only be brought about by the growers themselves."

We regret to announce the death of Mrs. Carrie D. Englar, wife of Mr. J. Walter Englar, former president of the Maryland State Horticultural Society. Mrs. Englar passed away at her home in New Windsor, on June 19, 1932. She was a fruit grower, and will be remembered by the fruit growers of the State by her efforts in behalf of a better fruit industry. Her passing is mourned by hosts of friends and our sympathy is extended to Mr. Englar in his loss.

FRUIT CROP CONDITIONS

According to the July report of the Bureau of Agricultural Economics, U. S. Department of Agriculture, there is an estimated prospect of a total of 134 million bushels yield of apples which is 34 per cent less than 1931, or about equal to the 1929 crop. The crop condition of apples for the whole country is estimated at about 51.7 per cent of normal crop, compared to 69.5 per cent for July 1, 1931. Maryland shows a condition of 45 per cent of a normal crop, compared to 54 per cent reported for June 1, 1932, and 76 per cent for July 1, 1931. Alternate bearing, late freeze and heavy June drop have had their influence in reducing the crop. Scab has shown great activity in Maryland and the Shenandoah Valley, and is reported by growers as being serious in the Ohio Valley and the Middle West. Codling moth has been doing some damage, but not serious except in certain orchards or sections.

A cablegram on July 11, reported prospects of less than average crop of apples, pears, and plums in England. Quality is reported as doubtful due to insect and disease injury.

Peaches are reported as a probable total of 47,216,000 bushel crop for the United States, or about 38 per cent less than the 1931 yield. The 10 Southern States forecast on July 1, a 5,972,000 bushels crop, or 73 per cent less than in 1931, and 35 per cent less than the crop of Georgia *alone* in 1931. Maryland condition on July 1 shows 42 per cent normal crop compared to 52 per cent estimate of June 1, 1932, and a reported 80 per cent condition on July 1, 1931. In states competing with Maryland markets, the July 1 condition reports are as follows: New York 82 per cent, New Jersey 75 per cent, Pennsylvania 58 per cent, Ohio 37 per cent, Indiana 10 per cent, Illinois 9 per cent, Michigan 75 per cent, Missouri 8 per cent, Delaware 54 per cent, Virginia 23 per cent, West Virginia 16 per cent, North Carolina 58 per cent, South Carolina 35 per cent, Georgia 22 per cent.

Pears are reported as 54.9 per cent normal compared to 60.2 per cent normal on July 1, 1931, for the whole country. Maryland reports 47 per cent as compared to 55 per cent on June 1, 1932, and 68 per cent on July 1, 1931.

Grape reports for the United States show about a 4 per cent increase over condition reports of July 1, 1931, or an estimated crop of about 2 million tons. Maryland shows a 76 per cent condition or about 669 tons estimated production compared to 671 tons in 1931.

THE TIME IS UP

July 16 was the dead line for using arsenate of lead in sprays, and it is a good plan to take no chance on later use of lead unless fruit is to be washed. We will win new friends and keep our old friends, too, if we all work toward removing suspicion of the public toward fruit containing spray residue.

If you haven't stopped cultivation, better plan to stop it now. Some growers have cover crops sown and up a few inches. Others stopped about July 1 or before, and are getting good cover crops of grass and weeds. Let's watch our orchard costs.

B. G. PRATT

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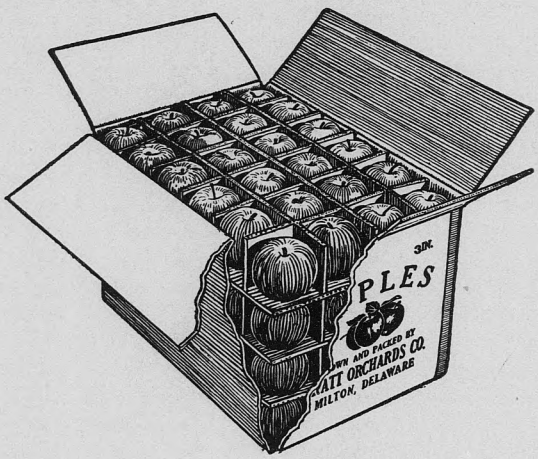

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Apples in "apple-cell" cartons keep perfectly, cost less to store and handle, and bring better prices on the market. We used them ourselves before we recommended them to you.

Any special cartons of any specific sizes can be supplied, but the standard sizes (the same as Western boxes) are as follows:

200—2¼", 160—2½", 112—2¾", 96—3", 48—3" (½ bushel), 72—3¼" or 48—3½" for apples packed either cheek up or stem up.

We are sales agent for one of the largest, oldest and most reliable carton manufacturers in the East. We know you will be pleased with this beautiful and sturdy carton.

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